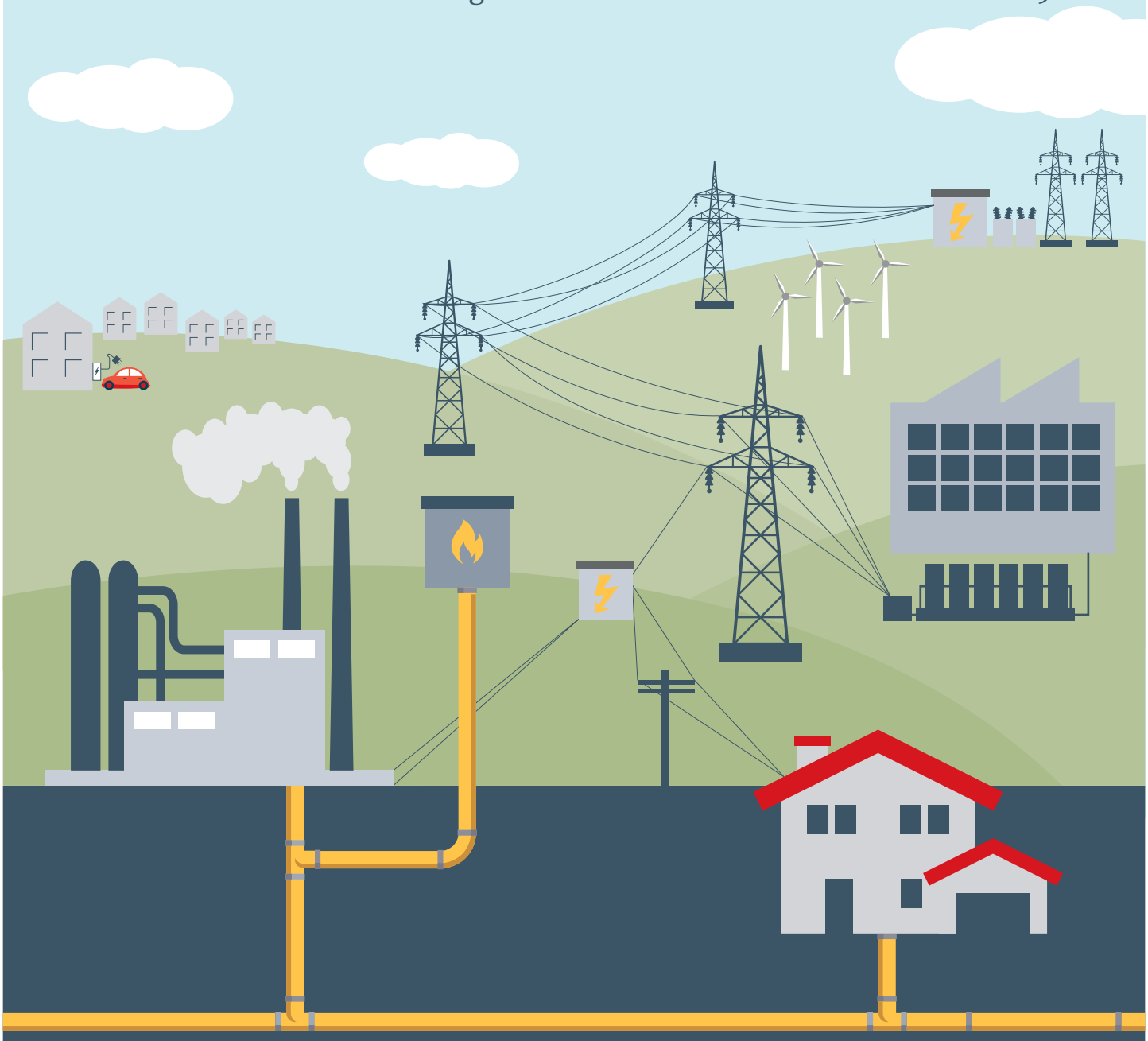
Network research paper

1. Future networks – setting the scene

October 2019



CORNWALL INSIGHT

CREATING CLARITY

SHAKESPEAREMARTINEAU

COMPLETE STRATEGY

About the authors

CORNWALL INSIGHT
CREATING CLARITY

Cornwall Insight
enquiries@cornwall-insight.com
01603 604400

COMPLETE STRATEGY

Complete Strategy
hello@complete-strategy.com
0207 867 3730

SHAKESPEAREMARTINEAU

Shakespeare Martineau
enquiries@shma.co.uk
0330 024 0333

Content

About the Authors

CORNWALL INSIGHT

CREATING CLARITY

Cornwall Insight is the pre-eminent provider of research, analysis, consulting and training to businesses and stakeholders engaged in the GB, Irish and Australian energy markets. Our independent experts focus on regulatory, policy, and commercial issues. The Cornwall Insight team leverages a powerful combination of analytical capability, practical understanding of how the markets function, and a detailed appreciation of industry codes, procurement models and policy frameworks. We deliver insight to our customers through:

- Publications – Covering the full breadth of the GB energy industry our reports and publications help our customers keep pace with the fast moving, complex and multi-faceted markets by collating all the "must-know" developments and breaking-down complex topics
- Market research and insight – Providing comprehensive appraisals of the energy landscape helping customers track, understand and respond to industry developments; effectively budget for fluctuating costs and charges; and understand the best routes to market for power and flexibility services
- Training, events and forums – From new starters to industry veterans, our training courses equip teams with the right knowledge and skills to support business growth ambitions
- Consultancy – Energy market knowledge and expertise utilised to provide deep insight to help develop business strategies and prove they are viable

COMPLETE STRATEGY

Complete Strategy works in partnership with regulated companies to develop and deliver regulatory change and compelling strategies. The team takes pride in providing practical strategic and regulatory advice and often works alongside client teams, supplementing their own capabilities. Complete Strategy is a network of experienced consultants with a track record of providing the highest quality advice for its clients. The team has worked with and for economic regulators, government departments, regulated companies and investors. The team has direct experience of over 20 different price control reviews, spanning energy, water and telecommunications.

SHAKESPEAREMARTINEAU

Shakespeare Martineau have an enterprising spirit and clear ambition to do things differently. For the company it's all about mindset. It's a way of thinking and behaving that fits not only with its vision but also its clients. It's about collaborative working and a partnership ethos. Shakespeare Martineau is intent on shaking up its profession for the better, building something different…for its clients and people. It recognises that the world is changing, and law firms need to catch up, that's why it is heavily investing in ensuring its client experience is the best it can be.

1 Executive summary

This is the inaugural research paper in a series that will explore the evolution of regional flexibility markets and how they can support the development of an efficient, low carbon energy system. Entitled “Future Networks”, the series will be jointly prepared by Cornwall Insight, Complete Strategy and Shakespeare Martineau. This first foundational paper:

- Evaluates the drivers in the broader energy market that are leading to the inception and creation of markets for flexibility services at a regional level
- Explores the key, consequential developments leading up to the present day in the development of regional flexibility markets
- Sets the scene for what the future may hold given that the drive for greater flexibility value at a regional level will inevitably continue

1.1 Current picture

Today we see nascent but growing regional flexibility markets:

- Decentralisation and decarbonisation have catalysed growth in regional flexibility markets – the foundational catalyst for local flexibility markets is the drive for decarbonisation, and the increasing decentralisation of the GB energy system that has resulted from it. Over 30% of GB generation capacity was connected to the distribution network in 2018 and over 30% of the electricity consumed in GB is generated from renewable technologies, many of which are variable in output and often non-dispatchable.
- Dynamic future market drivers will only continue this – the increased decentralisation of energy generation means that distribution companies are facing generation-led constraints in some areas, rather than the more traditional planning determinant of demand-led reinforcement. But radical generation and demand drivers will shape the distribution network decisions in the future. While electricity demand has fallen in the short-term, it is projected to increase dramatically with the anticipated widespread take-up of electric vehicles (EVs) and heat pumps (collectively low carbon technologies or LCTs) in the 2030s.
- Regional flexibility markets, while nascent, are developing across GB – all Distribution Network Operators (DNOs) and one Independent DNO (IDNO) have made a commitment to the development of flexibility markets. Albeit the need for flexibility procurement varies significantly across the country depending on the variation in the spare generation capacity available. At the time of writing, Active Network Management (ANM) is being widely adopted, and all DNOs are trialling flexibility procurement. Projections for 2019 in September were that over 900MW of market-based regional flexibility generation would be procured.
- Market consensus is that flexibility markets can lead to least cost solutions – the increase of distribution-connected generation and end user demand creates opportunities for significant cost savings if the two can be managed to avoid creating network constraints and best use existing network assets. This approach is part of the emerging distribution system operator (DSO) role and the “DNO to DSO” transition, under which power flows on distribution networks are more actively managed. One element of this is the procurement of flexibility from users connected to the network to offset the need for network reinforcement through ‘stand by’ services which enable networks to operate closer to their physical limits.
- Regulatory impetus is firming up – Ofgem and BEIS’ joint Smart Systems and Flexibility plan set out models for a possible DNO to DSO transition, and latterly Ofgem’s RIIO-ED2 programme has featured a specific focus on the emergence of DSOs.
- Lack of standardisation characterises current existing flexibility procurement – to date, DNOs have been ‘learning by doing’. This has delivered significant benefits – several tenders have already led to successful procurement outcomes. However, this has resulted in contrasting approaches, and a feature of ongoing flexibility procurement

is that commercial trials (and latterly business as usual approaches) are being rolled out without requirements for the standardisation of these products across DNOs.

- But greater commonality of outcomes could flow from industry coordination – the Open Networks project being led by the Energy Networks Association (ENA) is seeking to coordinate and standardise approaches across network companies. It leads on developing the rules and approach for implementing flexibility procurement across all DNO regions, as well as other elements such as integrated whole system network planning.

1.2 Future outlook

The journey to regional flexibility markets is just beginning. The transition to more actively managed distribution networks will continue and is, in our view, essential to maximise the value from existing infrastructure and keep costs down for bill-payers. This transition is ambitious, completely changing the way in which distribution networks are operated. Delivering this ambition is reliant on a multi-stakeholder integrated planning and operational approach, which in turn is heavily dependent on data, communications and co-operation.

At the hub of this approach lies competition, where price signals need to be sufficient to drive a response, which is effectively communicated to potential participants. Against this lies the backdrop of the new distribution price control – RIIO-ED2 – which will look to further embed flexibility and value into DNOs' business plans.

Considering this unfolding landscape, we identify a series of opportunities and challenges that lie ahead:

The key opportunities are:

- Given uncertain future demand regional flexibility could lower costs and stranded asset risks – there is a key opportunity in the optionality created by flexibility procurement compared to the build out of capital-intensive infrastructure (which risks stranded assets). Shorter term flexibility procurement can defer reinforcement decisions, meaning reinforcement goes ahead only once there is a proven need (i.e. without relying on an inherently uncertain forecast need as with the status quo).
- Regional flexibility value could catalyse an industrial boon in flexible, smart tech in GB – providing further value for flexibility could instigate further opportunities for investment in flexible and smart technologies.

The critical challenges are:

- Ensuring a level playing field for all – incorporating customers connected to IDNO networks into regional flexibility markets will be challenging but must be achieved to ensure the best whole system outcome.
- Balancing technological innovation with consumer protection and equity – technology and industry processes need to develop further in order to deliver a smarter, more flexible system. Cyber security and data access will be increasingly important. As part of this, appropriate consumer protection and regulatory change in response to the technological and data developments will be paramount to delivering good customer experiences equitably and without detriment. The distributional impact of the implementation of new charges or levies on the wide variety of users of distribution systems should be continually evaluated as part of this transition.

1.3 Partner point of view

COMPLETE STRATEGY

Cornwall Insight highlights the areas where the role of DNOs and the nature of DNO activities will need to change as the energy system is transformed to support the government's net zero commitment.

Change of this magnitude will present a challenge for Ofgem. Fundamentally, the regulator will need to decide where to intervene in the development of the market and how to take account of unanticipated developments.

Of course, the RIIO framework has been designed to accommodate this type of uncertainty:

- The focus on end-results (through the output and incentive regime) will allow Ofgem to allow companies the freedom to explore different ways of delivering what customers need
- The emphasis on innovation will encourage companies to explore the emerging market environment
- The use of uncertainty mechanisms will provide protection to companies and customers from the impact of unanticipated development
- However, in the forthcoming RIIO-ED2 price control, Ofgem will need to work hard to strike the right balance between competing policy and regulatory objectives

SHAKESPEAREMARTINEAU

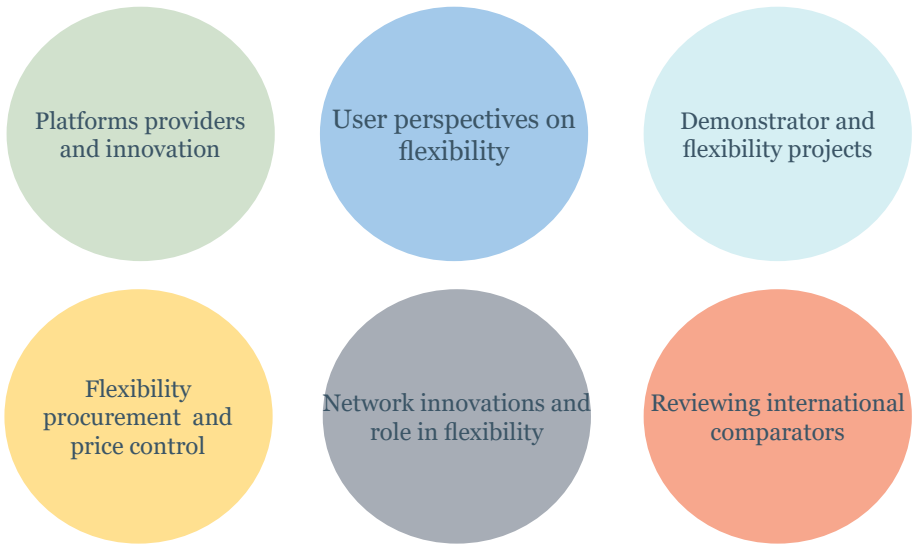
As this paper highlights, we are in a period of unprecedented change in energy markets. There are real challenges for the networks which will require innovation and investment and the RIIO price controls will need careful calibration to achieve the right balance between risk and reward.

At the same time, traditional roles are changing with the emergence of actively managed distribution networks and a need for whole of system approaches to ensure that policy objectives are achieved.

The price control mechanisms and the wider regulatory frameworks will need to ensure that roles and responsibilities remain clearly defined. As these roles evolve and avoid the risk that the interfaces between regulatory obligations become blurred.

1.4 The "Future Networks" Series

This paper is a scene setter for our further "Future Networks" discussion papers including:



“

We have witnessed the accumulation of smaller capacity connected at lower voltage levels, with over 30% of generation capacity connected to the distribution network at the end of 2018.

2 Dynamic and changing markets

The GB electricity markets are undergoing a period of significant change which is expected to continue long into the future. Change is being driven by a transforming electricity generation mix against a backdrop of declining demand. Looking to the future, that demand decline is almost certain to reverse in the medium-term, while the decarbonising revolution in generation will if anything accelerate.

2.1 Decarbonisation and decentralisation of generation

In a trend echoed internationally across many well-established electricity markets, GB electricity generation is becoming increasingly decarbonised and decentralised. In GB these trends have been driven by a range of factors including falling technology costs, government subsidy (until very recently) and in some cases additional value derived from “embedded benefits”[1].

We have witnessed the accumulation of smaller capacity connected at lower voltage levels, with over 30% of generation capacity connected to the distribution network at the end of 2018. Likewise, over 30% of the electricity consumed in GB is generated from renewable technologies, many of which are variable and non-dispatchable (see Figure 1 on page 9).

2.2 Demand will rise with heat and transport electrification

National electricity demand has been in decline since 2005 driven by improved energy efficiency, response to increasing prices and the rise in behind the meter generation. However, electrification of transport in the medium-term and heat in the longer-term is expected to drive increases in demand, mostly on the distribution network. In all four of National Grid’s Future Energy Scenarios (FES), demand rises significantly over the coming years.

2.3 Network impacts

The increased decentralisation of energy generation means that distribution companies are facing generation-led constraints in some areas, rather than demand-led reinforcement. In these instances, the traditional solution of costly network reinforcement may not present the most efficient solution. Without innovative approaches, this would result in higher than necessary costs for consumers.

Similarly, if not handled intelligently, the anticipated future demand increases on low voltage networks could result in material levels of expensive network upgrades.

The criticality of this risk is evidenced by the network companies’ current innovation focus, where managing demand from EVs has contributed to two of the three approved electricity Network Innovation Competition[3] (NIC) applications in 2018[4]:

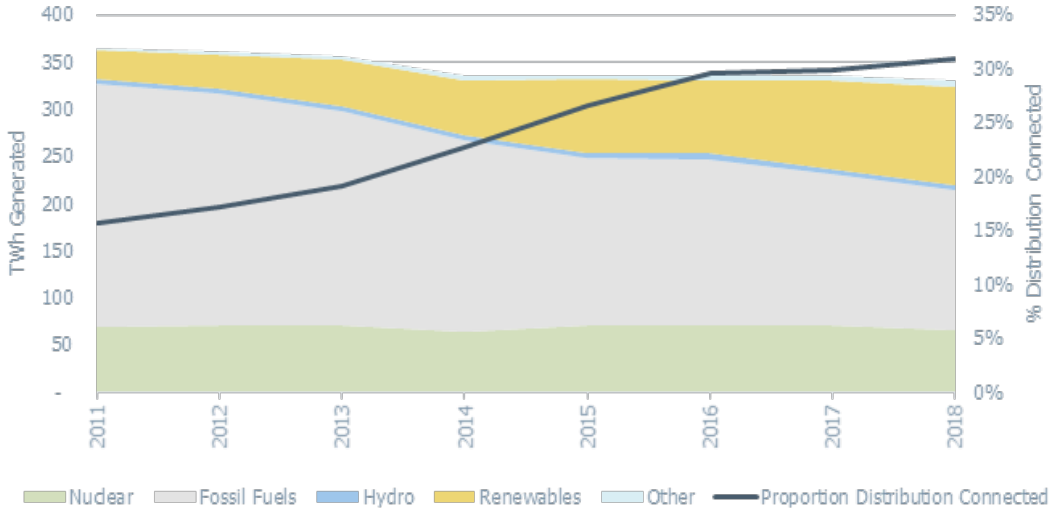
- Charge[5], led by Scottish Power Energy Networks (SPEN) will overlay transport and network mapping to improve visibility of appropriate network charging points

1 These are predominantly supplier costs that are reduced or avoided via contracting with small-scale generation connected at the distribution network level instead of the national transmission system
2 https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes
3 The NIC is an annual competition for network companies to compete for up to £70mn in funding to demonstrate and develop new technologies, operational arrangements or commercial arrangements
4 https://www.ofgem.gov.uk/system/files/docs/2018/11/competitions_brochure_2018.pdf
5 https://www.spenergynetworks.co.uk/pages/charge.aspx

- Optimise Prime[6] will conduct trials and gather data on the charging patterns of different commercial EV fleets and their network impact

The increase of distribution-connected generation and end user demand creates opportunities for significant cost savings if the two can be managed to avoid creating network constraints.

Figure 1: Generation mix and proportion connected to the distribution network



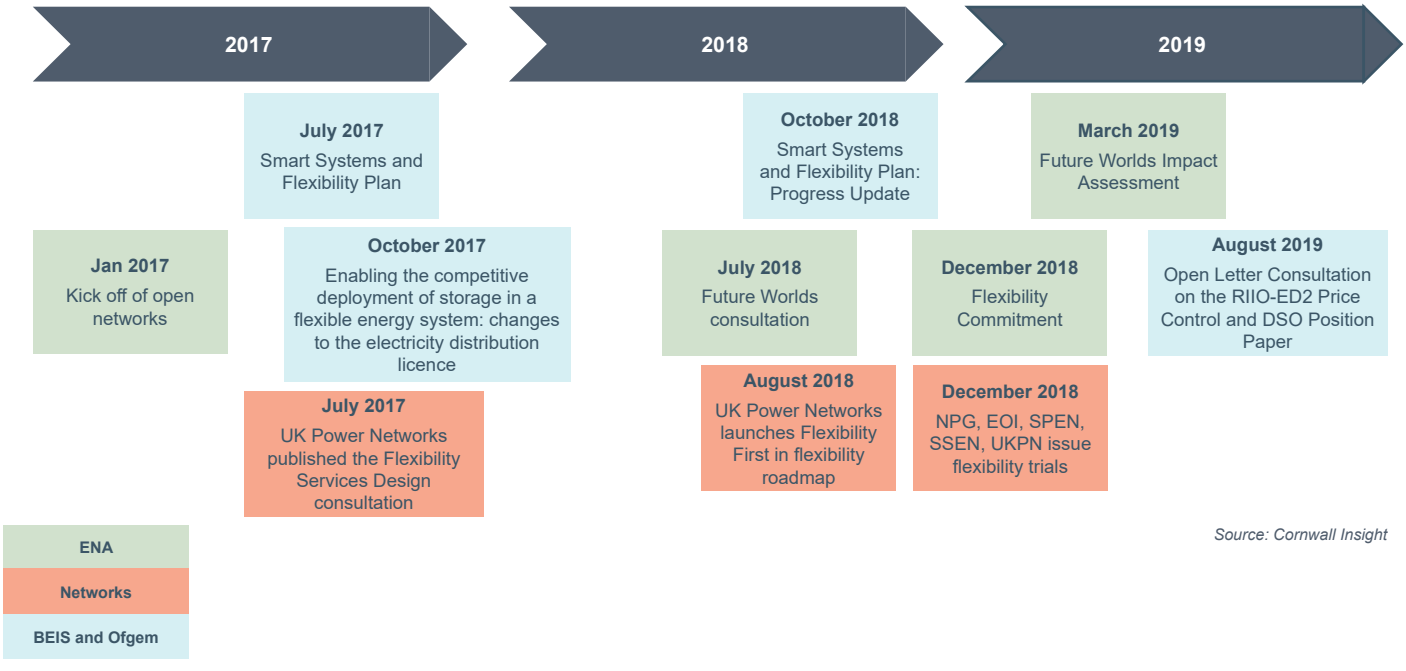
Source: BEIS Digest of UK Energy Statistics 2019[2], analysed by Cornwall Insight

3 Regulatory and policy impetus

The emergence of regional flexibility markets is against a backdrop of many interlinked ongoing policy developments.

These are summarised in Figure 2.

Figure 2: Timeline of policy and regulatory milestones



Source: Cornwall Insight

6 https://www.optimise-prime.com/

The development of regional flexibility markets has been underpinned by Ofgem and BEIS' joint *Smart Systems and Flexibility Plan*, published in July 2017[7]. It highlighted the potential to save consumers £40bn on electricity bills through intelligent use of flexibility.

As a result of this plan, Ofgem has made changes to the electricity generation licence to ensure it is fit for purpose for storage as well as for traditional generation, with a consultation on this subject issued in October 2017[8]. The plan also set out possible models for DNOs to adapt through the transition to DSOs.

At the same time, the creation of markets which work for flexibility is a key element of nascent DSO activity, being driven by DNO recognition of the desirability of such a transition, as well as by incentives emerging under price controls.

In August 2019, Ofgem published an open letter on the next price controls for electricity distribution companies (RIIO-ED2) which start in April 2023[9]. Ofgem used this publication to stress the importance of the development of DSO activities by publishing a position paper on DSO development to inform the run up to the price control[10]. This paper highlighted four 'strategic outcomes':

1. Clear boundaries and effective conflict mitigation between monopolies and markets
2. Effective competition for balancing and ancillary services, and other markets
3. Neutral tendering of network management and reinforcement requirements, with a level playing field between traditional and alternative solutions
4. Strongly embedded whole electricity system outcomes

The importance of these regulatory reforms has been given greater urgency by the Government's recent commitment to net zero greenhouse gas emissions by 2050. The majority of commentators agree that greater variety in flexibility solutions and markets, including those at the regional level, will be a key element in the delivery of that target.

"The majority of commentators agree that greater variety in flexibility solutions and markets, including those at the regional level, will be a key element in the delivery of net zero greenhouse gas emissions by 2050.

7 https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan
8 https://www.ofgem.gov.uk/publications-and-updates/clarifying-regulatory-framework-electricity-storage-licensing
9 https://www.ofgem.gov.uk/publications-and-updates/open-letter-consultation-riio-ed2-price-control
10 https://www.ofgem.gov.uk/publications-and-updates/ofgem-position-paper-distribution-system-operation-our-approach-and-regulatory-priorities

4 Regional flexibility markets: current picture

4.1 DNO led initiatives are widespread despite being in early stages of development

All DNOs have now carried out flexibility procurement trials in some form. Indeed, projections for 2019 in September were that over 900MW of market-based flexible demand and generation would be procured by the DNOs. Each DNO's position is summarised in Figure 3.

Figure 3: DNO flexibility procurement to date

DNO	Current Position

Electricity North-west	• Three flexibility services identified:
	  ○ Restore: Provide an immediate response following an unplanned network event
	  ○ Sustain: Flex supply up or down at peak times to help manage network constraints
	  ○ Continuous: Fulfil a continuous capacity requirement
	• Website includes a map showing where services are required[11]
	• Several requests for proposals to provide flexibility services have concluded without procurement due to lack of interest

Northern Powergrid	• DSO strategy 'DSO v1.0' published in December 2018[12] • Three identified user cases of: deferral of reinforcement, planned maintenance and emergency support • 'DSO v1.0' included nine areas where procurement was targeted for winter 2019/20 which have since been revealed to have limited commercial viability • Expecting to tender for customer flexibility at alternative locations later in 2019

Scottish and Southern Energy Network	• Four services identified for constraint managed zones (CMZs)[13]:
	  ○ CMZ Prevent: Required to manage peak demand on the network, usually weekday evenings
	  ○ CMZ Prepare: Required to support the network during planned maintenance work
	  ○ CMZ Respond: Required to support the network during fault conditions as a result of maintenance work
	  ○ CMZ Restore: Utilisation-only product, needed to support the network during networks faults that occur as a result of equipment failure
	• Making all congestion areas visible on PicloFlex[14]
	• Secured flexibility for six sites to date

Scottish Power Energy Networks	• Identified three constrained areas where flexibility services might be a viable solution to defer reinforcement • Tendered on PicloFlex for flexibility services and currently in talks with potential providers

UK Power Networks	• Identified three 'core use cases':
	  ○ Load related reinforcement deferral
	  ○ Managing planned maintenance
	  ○ Responding to unplanned outages
	• Announced results of first competitive flexibility tender in May 2019[15]
	  ○ Contracted 18.2MW from six companies across eight locations
	  ○ Total value £450k
	• Potential for 206MW procured by 2023

Western Power Distribution	• Three products procured:
	  ○ Secure: Required to manage peak demand on the network
	  ○ Dynamic: Required to support the network during fault conditions
	  ○ Restore: Needed to support the network during faults that occur as a result of equipment failure
	• Carries out competitive tenders where possible, with prices capped to avoid high prices in areas with low liquidity
	• All information published on its 'Flexible Power Portal'[16]
	• Two procurement cycles carried out to date
	  ○ 28MW contracted in 2018 at fixed prices
	  ○ 21.5MW contracted in 'cycle one' in 2019 at fixed prices, against a total sought of 93.4MW
	  ○ 184MW sought in 'cycle two' in 2019 – results expected October 2019

Source: Cornwall Insight

11 https://www.enwl.co.uk/zero-carbon/flexible-services/
12 https://www.northernpowergrid.com/asset/0/document/4682.pdf
13 https://www.ssen.co.uk/SmarterElectricity/Flex/
14 https://picloflex.com/
15 https://www.ukpowernetworks.co.uk/internet/en/have-your-say/documents/Post%20Tender%20Report%20-%20201819.pdf
16 https://www.flexiblepower.co.uk/

4.2 Flexibility procurement approaches are non-standardised

There are a range of approaches being adopted for regional flexibility procurement. The truly common characteristic of the approach taken by the DNOs to date has been 'learning by doing'. This has delivered significant benefits – several tenders have already led to successful procurement outcomes.

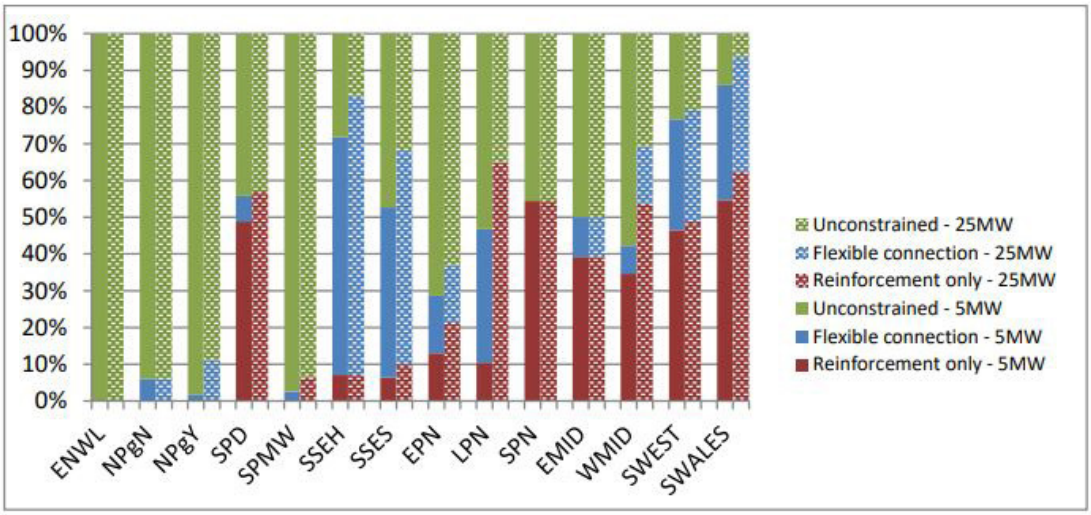
But at a detailed level commercial trials (and latterly business as usual approaches) are being rolled out without requirements for the standardisation across DNOs. There is also a common issue of lack of liquidity at this stage to get markets competitive and established.

The approaches taken by WPD and UKPN are good examples of the contrasts seen between DNOs. WPD's procurement to date has been on a 'fixed price' basis with the company stating that it will run tenders where there is sufficient liquidity for competition to drive down prices. By contrast UKPN has proceeded on a competitive basis, but in some areas it has had insufficient interest (or clearing prices have been higher than the network benefit delivered) preventing the use of this innovative service.

Standardisation of approaches has, to date, proven difficult. This may in part reflect that the need for flexibility procurement varies significantly across the different regions of the country. There are many drivers for this, including socio-economic drivers in different regions both now and in the past. Most notably, areas in the north of England which were historically dominated by heavy industry, typically have more network headroom as a result of the decline in those industries.

An Ofgem report in 2017 showed the extent to which each DNO licensee could incorporate additional 25MW and 5MW generators respectively. It considered whether new generators could be connected on either an unconstrained basis, on an ANM scheme, or only through reinforcement. This illustrates the regional diversity in available network capacity which has a consequential bearing on regional flexibility development by DNOs. This is summarised in Figure 4. Examining this data, it is not surprising that successful procurement of flexibility to date has been dominated by WPD and UKPN given the high level of reinforcement or flexible connection in their regions. Whilst the rapid pace of change in recent years no doubt means that many licensees would now report different positions, it is likely that the spread across regions remains significant.

Figure 4: Extent of generation constraints by DNO licensee



Source: Ofgem

17 https://www.ofgem.gov.uk/system/files/docs/2017/02/unlocking-the-capacity-of-the-electricity-networks-associated-document.pdf

4.3 Flexible connections are on the rise

All DNOs also now offer so-called flexible connections under ANM schemes. Under these arrangements, prospective generators seeking a connection which would trigger the need for network reinforcement can either accept a standard connection or a flexible connection under an ANM scheme.

Under a standard connection, the DNO will reinforce the network to accommodate the new generator. As a result, there will be a time delay while reinforcement work is carried out and the connection charge for the new generator will be high under the 'shallowish' connection charging regime.

Under a flexible connection with an ANM scheme, the DNO will not reinforce but will install control and monitoring equipment at the point of connection which can reduce the export capability of the generator. As a result:

- The generator will be able to connect relatively quickly – the only new network assets needed are those to connect the new generator to the existing network and the ANM hardware.
- The generator will be able to connect relatively cheaply as it will not contribute to reinforcement costs. It may be required to contribute to the costs of the ANM equipment but in comparison to reinforcement costs these are typically low.
- The output of the generator will be automatically curtailed when export limits on the network are reached. The DNO will typically estimate the likely extent of curtailment, but that may change over time as, for example, the behaviour of other users behind the constraint evolves.

At the end of 2018 there were 2.5GW of ANM and flexible connections, with a further 1.8GW expected for 2019. It is clearly becoming a growing feature of the marketplace, allowing continued connection of new decentralised generation with manageable risks to project developers and investors. But there is a tipping point at which the risk of uncompensated curtailment for the next new generator will become too great and deter investment.

4.4 Open Networks project could lead to greater coordination

During this period of trialling flexibility procurement and expanding ANM schemes DNOs have also engaged in using the new space opened by the regulatory and policy impetus to shape the eventual DSO model they think would be most optimal in the long term.

Aside from unilateral announcements of DNO-DSO transition strategies by DNOs, this has predominantly been done through the coordination provided by the Open Networks project. Launched in January 2017, the project leads on developing the rules and approach for implementing flexibility procurement across all DNO regions, as well as other elements such as integrated whole system network planning. It integrates with the BEIS and Ofgem *Smart Systems and Flexibility Plan* and has been tasked with delivering a number of outputs to help inform future policy.

The major punctuation mark of Open Networks has thus far been the publication of the '*Future Worlds*' consultation which considered different ways in which distribution and transmission network companies could interact to coordinate and enable flexibility markets to develop and flourish. The five future worlds were initially defined in a July 2018 consultation[18] as shown in Figure 5.

As well as a public consultation on the impacts of each world on various stakeholders, the relative costs and benefits of the five worlds was assessed and ENA subsequently consulted on that analysis[19]. The analysis carried out assumed that all worlds can deliver similar levels of flexibility to 2050, and so focused on the costs associated with achieving that end state in each of the worlds. It also effectively reduced the number of worlds assessed to four, by treating world C as a 'layer' on top of the other worlds, on the assumption that improved price signals will be introduced and so will be a feature of all future worlds.

The Open Networks project has also focused on how to accelerate the journey to these possible future worlds. A key development in that spirit has been the flexibility commitments made by all DNOs and the IDNO GTC, which was published in December 2018[20].

18 http://www.energynetworks.org/assets/files/14969_ENA_FutureWorlds_AW06_INT.pdf
19 http://www.energynetworks.org/assets/files/ON-PRJ-%20IA%20consultation%20document%20-%20Master%20060319%20(For%20publishing).pdf
20 http://www.energynetworks.org/assets/files/ENA%20Flex%20Committment.pdf

Figure 5: Future Worlds

Future World		Description
A	DSO Coordinates	The DSO acts as the neutral market facilitator for all Distributed Energy Resources (DER) and provides services on a locational basis to National Grid in its role as the Electricity System Operator (ESO).
B	Coordinated DSO-ESO Procurement and Dispatch	The DSO and ESO work together to efficiently manage networks through coordinated procurement and dispatch of flexibility resource.
C	Price-Driven Flexibility	Changes developed through Ofgem's reform of electricity network access and forward-looking charges have improved access arrangements and forward-looking signals for Customers.
D	ESO Coordinates	The ESO is the counterparty for DER with DSOs informing the ESO of their requirements.
E	Flexibility Coordinators	A new national (or potentially regional) third-party acts as the neutral market facilitator for DER providing efficient services to the ESO and/or DSO as required.

Source: Open Networks Future Worlds Consultation

These commitments are:

- Opening up requirements for building significant new electricity network infrastructure to include smart flexibility service markets as part of day-to-day operations
- Openly test the market to compare relevant reinforcement and market flexibility solutions for all new projects of any significant value
- Working with Ofgem and other stakeholders to develop the forthcoming RIIO-2 price control framework to ensure that the financial incentives that network companies receive are fully aligned with the greater use of flexibility services

The lack of standardisation has been acknowledged by the Open Networks project, which is now seeking to coordinate and standardise approaches through setting clear common objectives:

- Information sharing and working collaboratively across a range of stakeholders to deliver DSO and better outcomes for consumers
- Ensuring that any transition and changes are customer-centric and deliver better outcomes for customers and society
- Improving the consistency of approach across the DNOs through aligned processes and interaction
- Greater visibility of data
- Early identification and resolution of conflicts of interest

The Open Networks project entered phase 3 in 2019 which saw the addition of a whole energy systems workstream, recognising the interrelated nature of electricity, gas and heat, especially going forwards. More information can be found in the phase 3 project initiation document[21].

21 http://www.energynetworks.org/assets/files/ON-PRJ-Phase%203%20PID-v2%20(Post%20consultation)-Published--.pdf

> Regional flexibility markets are expected to create new markets and roles, providing further services and value to a variety of consumers, platforms and flexibility providers.

5 Opportunities and Challenges

Smarter, more flexible networks provide a range of potential benefits compared to the status quo, particularly with an increasingly decentralised electricity system. However, they also represent a significant diversion from a well-established traditional approach that has delivered very secure electricity networks.

5.1 Opportunities

As BEIS notes in the *Smart Systems and Flexibility Plan*, smart energy is central to many other changes in both the energy system and the wider economy. It is an important part of the Industrial Strategy, given its potential to reduce energy costs, increase productivity, and put UK businesses in a leading position.

Given the rapidly changing nature of the energy system (including heat and transport) optionality is currently highly valuable. The build out of capital-intensive infrastructure projects comes with a significant risk of stranded assets, as evidenced with the historic loss of substantial amounts of industrial and manufacturing load in the north of the country.

While electricity demand is expected to increase on a national basis, with electrification of heat and transport, policy decisions have yet to be locked-in and the market may develop other emergent technologies. Even if demand does increase, we do not yet know where exactly this is expected to be strongest (although DNOs are currently developing their modelling capability).

Policy makers and network operators are increasingly recognising that accelerating and deepening the development of regional flexibility markets allows reinforcement decisions to be deferred until there is greater certainty that the network reinforcements are needed, and therefore should contribute to delivering a decarbonised energy system at the lowest possible cost.

Providing further value for flexibility at a regional level could instigate further investment in flexible and smart technologies. Initially one would expect this with utility scale and non-domestic behind the meter flexibility assets, but in time cost reductions and lessons learned from scale adoption could see emerging flexibility models grow faster at the household level. Here behavioural and technological barriers have thus far slowed widespread adoption and participation in flexibility markets, but new economic signals more generally for regional flexibility would provide added impetus.

In general, regional flexibility markets are expected to create new markets and roles, providing further services and value to a variety of consumers, platforms and flexibility providers. The prize is the development of a new technology enabled, market based, energy industry service sector with active engagement in multiple parts of the energy markets.

5.2 Challenges

The work of the Open Networks project to date, and in particular the development of the future worlds, has focused on coordinating the procurement of flexibility services between DNOs and the ESO. Over recent years, the number of customers connected to IDNO networks has increased dramatically. This adds a further level of complexity, with coordination needed across IDNOs, DNOs and the ESO.

Regulation should not all be about facilitating the creation of new markets and reducing costs overall – important as that is – but should also have one long-sighted eye on what these markets means for different bill-payers. As new services, markets and systems evolve it will necessitate proactive, expedient and consumer focused regulatory change in order to deliver sustainable experiences and to avoid any inequity or detriment as part of this transition.

Government and Ofgem are already looking to ensure consumer interests are respected as new services are offered and new business models emerge, building on the principles of ensuring consumers are treated fairly, can understand what they are (and are not) buying and have their privacy protected.

In the case of independent aggregators[22] existing consumer protection tools already provide a level of protection for consumers.

Technology companies and service providers to consumers will need to develop their consumer offers to deliver information symmetry, jargon-free guides for consumer comprehension and clear articulation of the value being offered to consumers and the price they will pay for it.

The distributional impacts of implementation will also need to be continually considered. Some user groups may be unable to engage significantly with a more flexible system. Government and the regulator will need to consider whether those customers' inaction results in disproportionate benefits being shared elsewhere amongst the more able or affluent, or additional costs arising for those least able to bear them. For example, on the consumer side large businesses with demand-side response or generation technologies in place are currently best placed to take advantage of the value created from this transition, and BEIS has already noted the present lack of demand-side response from households or small businesses.

Once technology unlocks the benefits of regional flexibility markets for smaller consumers, the attention will need to shift to the distribution of costs and benefits between them, particularly in the politically charged domestic energy environment.

22 Organisations which optimise the energy demand and generation of a portfolio of customers in response to commercial signals from wholesale, balancing or flexibility markets

CORNWALL INSIGHT

CREATING CLARITY

Level 3, The Union Building
51-59 Rose Lane, Norwich, Norfolk, NR2 1TF

T 01603 604400
E enquiries@cornwall-insight.com
W cornwall-insight.com